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Ning Wei

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EXAMINER

DIRAMIO, JACQUELINE A

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/718,996	Applicant(s) WEI, NING	
	Examiner Jacqueline DiRamio	Art Unit 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2, 5, 6, 12 and 37-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2, 5, 6, 12 and 37-47 is/are rejected.
- 7) ☒ Claim(s) 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 14, 2008 has been entered.

Status of the Claims

Applicant's amendments to claims 2, 5, 6 and 12 are acknowledged, as well as the cancellation of claims 1, 3, 4, 7 – 11, and 13 – 36, and the addition of new claims 37 – 47.

Currently, claims 2, 5, 6, 12 and 37 – 47 are pending and under examination.

Withdrawn Objections and Rejections

The previous objection to claim 1 is withdrawn in view of the cancellation of this claim.

All previous rejections of claims 1, 3, 4, 7 – 9, and 13 under 35 U.S.C. 103(a) are withdrawn in view of Applicant's amendments filed April 14, 2008 cancelling these claims.

NEW GROUNDS OF REJECTION

Claim Objections

Claim 37 is objected to because of the following informalities:

Claim 37, line 8, fails to include the term "and" after the term "the analyte;" in order to clearly define that the "porous membrane" is the final element of the "assay device."

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 5, 6, 12, 37 – 41, 43 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brooks et al. (US 6,509,196), as evidenced by incorporated Brooks et al. reference (US 5,743,517), in view of Buck (US 6,258,548).

Brooks et al. teach a method for detecting an analyte in a test sample, said method comprising:

i) providing an assay device that comprises:

an application point (sample pad);

a contact region (conjugate pad) that contains test particles (detection probes) and internal control particles (calibration probes), the test particles being conjugated with a binding agent (first binding member) configured to specifically bind with the analyte;

a porous membrane in fluid communication with the application point and the contact region, the porous membrane defining a detection zone in which is immobilized a detection reagent (second capture reagent) configured for specifically binding with the analyte and a control reaction zone (calibration zone) within which is immobilized a control detection reagent (third capture reagent) configured to bind with the internal control particles, wherein the detection zone and the control reaction zone are located downstream from the application point and contact region;

ii) contacting the assay device with the test sample, wherein a quantity of the analyte in the test sample binds to the binding agent of the test particles to form complexes that flow through the porous membrane and bind to the detection reagent in the detection zone to generate a detection signal, and wherein the internal control particles flow through the porous membrane and bind to the control detection reagent at the control reaction zone to generate a control (calibration) signal;

iii) detecting the intensity of the detection signal and the control signal; and

iv) comparing the intensity of the detection signal to the intensity of the control signal, wherein the quantity of the analyte within the test sample is proportional to the intensity of the detection signal calibrated by the intensity of the control signal (see column 1, lines 28-67; column 2, lines 1-30; column 3, lines 43-63; column 4, lines 16-50; column 5, lines 1-67; column 6, lines 1-67; column 7, lines 1-67; column 8, lines 1-31; column 9, lines 43-67; and column 10, lines 1-10).

With respect to the elements of the application point and contact region, these elements do in fact represent an application (sampling) pad and contact (conjugate) pad, wherein the contact pad includes the conjugated particles utilized in the assay device (see Figure 1; and column 4, lines 1-67 of incorporated reference of Brooks et al. (US 5,753,517), wherein this reference is incorporated in the primary reference of Brooks et al. at column 4, lines 42-50).

However, the primary reference of Brooks et al. fails to teach the inclusion of a scavenging zone within the application point, wherein the scavenging zone contains a non-diffusively immobilized capture reagent configured to specifically bind with the analyte, and wherein a quantity of the analyte in the test sample less than or equal to a predefined base quantity binds to said capture reagent at the scavenging zone prior to the contacting of the test sample with the detection probes or detection zone.

Buck teaches a lateral flow test strip and method for detecting an analyte in a test sample utilizing the test strip, wherein the method comprises:

i) providing the lateral flow test strip (flow-through assay device) that comprises:

a wicking (sampling) pad 14 that defines an analyte modulating zone (AMZ) (scavenging zone) in which is non-diffusively immobilized a binding ligand (first capture reagent) configured to specifically bind with the analyte;

a conjugate zone or pad 18 that contains an indicator reagent (detection probes) conjugated with a specific binding ligand (member) configured to specifically bind with the analyte;

a porous membrane 12 in fluid communication with the wicking pad and the conjugate zone, the porous membrane defining an analyte test zone (ATZ) (detection zone) in which is immobilized a binding ligand (capture reagent) for the analyte, wherein the ATZ is located downstream from the wicking pad and the conjugate zone; and

ii) contacting the test strip with the test sample, wherein a quantity of the analyte in the test sample equal to a predefined base quantity binds to said immobilized binding ligand at said AMZ and a quantity of the analyte in excess of the predefined base quantity binds to the specific binding ligand of the indicator reagents to form complexes that flow through the porous membrane and bind to the immobilized binding ligand in the ATZ to generate a test (detection) signal. The analyte modulating zone (AMZ) is included with the test strip in order to remove a fraction of the analyte from the sample prior to the sample reaching the analyte test zone (ATZ) to thereby increase the detectable range of analyte concentration, which is beneficial for samples that contain a high concentration of analyte (see Figure 1; column 2, lines 35-60; column 3, lines 30-67; column 4, lines 1-67; column 5, lines 17-34; Example 1 and Table 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the method of Brooks et al. a scavenging zone or analyte modulating zone (AMZ), wherein the sample is contacted with the AMZ prior to reaching the detection or test zone, as taught by Buck because Buck teaches the benefit of including an analyte modulating zone (AMZ) within a test strip in order to remove a fraction of an analyte from a test sample prior to the sample reaching an analyte test zone to thereby increase the detectable range of analyte concentration, which is beneficial for samples that contain a high concentration of analyte.

With respect to Applicant's claims 2, 6, and 41, Buck teaches that the immobilized binding ligand at both said AMZ and said ATZ comprises a capture antibody (see column 2, lines 35-52; column 4, lines 36-38; column 5, lines 17-34; and Example 1).

With respect to Applicant's claims 5 and 39, Brooks et al. teach that the analyte can comprise an antigen and the detection reagent in the detection zone can comprise an antibody, antigen, or hapten (see column 4, lines 16-41; column 6, lines 41-46; and column 7, lines 8-16).

With respect to Applicant's claim 12, Brooks et al. teach that the test particles comprise a substance, such as liposomes, luminescent labels, fluorescent labels, phosphorescent particles, or latex particles (direct visual labels) (see column 5, lines 15-40).

With respect to Applicant's claim 38, both Brooks et al. and Buck teach that the contact region/conjugate pad is located downstream of the application point/wicking pad (see Brooks et al.: column 4, lines 42-50; and Buck: Figure 1).

With respect to Applicant's claim 40, Brooks et al. teach that the binding agent of the test particles can comprise an antibody (see column 5, lines 15-47).

With respect to Applicant's claim 43, Brooks et al. teach that the test sample can be blood or derived from blood (see column 4, lines 24-33).

With respect to Applicant's claim 47, both Brooks et al. and Buck et al. teach the inclusion of a wicking/absorption pad within the assay device that is in fluid communication with the porous membrane and located downstream from the detection zone and the control reaction zone (see Figure 1 and column 4, lines 1-67 of incorporated reference of Brooks et al. (US 5,753,517), wherein this reference is incorporated in the primary reference of Brooks et al. at column 4, lines 42-50; and Buck: Figure 1; and column 4, lines 30-43).

Claims 42, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brooks et al. (US 6,509,196) in view of Buck (US 6,258,548), as applied to claim 37 above, and further in view of Selmer et al. (US 5,387,503).

The Brooks et al. and Buck references, which were discussed in the 103(a) rejection above, fail to teach that the analyte specifically comprises C-reactive protein.

Selmer et al. teach an assay method and test kit using internal calibration to measure an analyte in a test sample. The test kit comprises a solid support comprising

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a porous membrane defining a first and second discrete area, wherein the first discrete area contains an immobilized reagent capable of binding the target analyte and the second discrete area contains an immobilized reagent capable of binding a calibrator analyte. The test kit is suitable for detecting analytes that are of biological origin and would be carried out in doctor's office tests, wherein one of the test analytes suitable for quantitative detection includes C-reactive protein (see column 2, lines 27-57; column 3, lines 16-25 and lines 49-55; column 4, lines 3-7 and lines 19-36; column 5, lines 4-48; column 6, lines 1-4 and lines 24-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the method of Brooks et al. and Buck the detection of C-reactive protein as taught by Selmer et al. because Selmer et al. teach that C-reactive protein represents a suitable test analyte for quantitative detection in a test assay of this type, and is also a common analyte that is detected in doctor's office tests.

With respect to Applicant's claim 45, Buck teaches that the pre-defined base quantity that represents the amount of analyte in the test sample that is removed by binding in the AMZ is empirically established during manufacturing and quality control procedures for the specific analyte, wherein the amount of analyte bound by the AMZ allows for detecting an extended range of analyte concentration (see column 5, lines 17-34; Example 1 and Table 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine an optimum pre-defined base quantity of analyte that is bound to and removed by the AMZ as taught by Buck in order

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to optimize the assay method and allow for the detection of an extended range of analyte concentration.

Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brooks et al. (US 6,509,196) in view of Buck (US 6,258,548), as applied to claim 37 above, and further in view of Jou et al. (US 5,670,381).

The Brooks et al. and Buck references further fail to teach that the control detection reagent in the control reaction zone comprises a polyelectrolyte having a net charge opposite to the net charge of the test particles and/or internal control particles.

Jou et al. teach a device for performing an assay comprising a porous material containing a capture or reaction zone with an immobilized capture reagent. The device utilizes a specific binding member attached to a charged substance that is contacted with an analyte of interest to form a complex. The complex binds to the immobilized capture reagent in the capture or reaction zone through ion-capture, wherein the capture reagent is oppositely charged with respect to the charged substance of the analyte complex. The capture reagent preferably comprises an anionic or cationic polymeric substance (polyelectrolyte), which enables the production of a generic solid phase device for use in specific binding assays. Assay procedures for many different analytes can use the same solid phase material which contains a predetermined zone of anionic or cationic capture polymer rather than an immobilized binding member capable of binding only a specific analyte as found in conventional flow-through or test-strip devices. Further, the ion-capture technique increases the potential number of

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complexes that can be immobilized on the solid support (see column 6, lines 25-40; column 7, lines 1-46; column 10, lines 63-65; column 19, lines 29-67; column 22, lines 29-67; and column 23, lines 1-26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include with the method of Brooks et al. and Buck a polyelectrolyte as the reagent in the control reaction zone as taught by Jou et al. because Jou et al. teach the benefit of using an anionic or cationic polymeric substance as the immobilized capture reagent in a capture zone because the polymeric substance allows for the binding of a conjugated substance or complex to a solid phase support material through ion-capture, which increases the potential number of complexes that can be immobilized on the solid support and allows for the production of a generic solid phase device, wherein many different analytes can use the same solid phase material which contains a predetermined zone of anionic or cationic capture polymer rather than an immobilized binding member capable of binding only a specific analyte as found in conventional flow-through or test-strip devices.

Response to Arguments

Applicant's arguments filed April 14, 2008 have been fully considered but they are not persuasive. Applicant argues (see p7-10) the following main arguments:

1) The Brooks et al. reference fails to teach: (a) a "scavenging zone" that binds to and "captures" a certain quantity of analyte; (b) a separate sampling pad, wherein the

"scavenging zone" is defined by the sampling pad; and (c) a conjugate pad, wherein the detection probes are located on the conjugate pad;

2) The combination of Brooks et al. in view of Buck is misplaced because of the vastly different nature of these systems, wherein the AMZ of Buck does not take into account the non-specific binding that Brooks et al. is concerned with and therefore, would impact the operation of Brooks et al.; and

3) The Buck reference fails to teach a sampling pad that defines the "scavenging zone," a conjugate pad that contains detection probes; and a porous membrane that defines a detection and calibration zone.

However, these arguments are not found persuasive.

With respect to Applicant's first argument over the Brooks et al. reference, it is agreed that the reference fails to teach the inclusion of a "scavenging zone" that binds to and "captures" a certain quantity of analyte, which is why this reference was not a 102 anticipatory reference and was combined with the Buck reference for the teaching of and motivation for including this type of zone in a test strip device. However, the other elements of the test strip, i.e. the sampling pad and the conjugate pad, are taught by Brooks et al. which is evidenced by the incorporated reference of Brooks et al. (US 5,753,517) (see Figure 1; and column 4, lines 1-67 of incorporated reference of Brooks et al. (US 5,753,517), wherein this reference is incorporated in the primary reference of Brooks et al. at column 4, lines 42-50).

With respect to Applicant's second argument over the combination of Brooks et al. in view of Buck, it is unclear how these systems are vastly different when both

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comprise test strip devices and methods of use in detecting analytes of interest through the use of lateral flow and specific binding. In addition, it is irrelevant that Buck does not take into account the non-specific binding that Brooks et al. is concerned with because the reference was only combined with Brooks et al. in order to provide the teaching of and motivation for including an AMZ, i.e. analyte modulating zone (scavenging zone), within a test strip device. Further, Buck teaches that the pre-defined base quantity that represents the amount of analyte in the test sample that is removed by binding in the AMZ is empirically established during manufacturing and quality control procedures for the specific analyte, wherein the amount of analyte bound by the AMZ allows for detecting an extended range of analyte concentration (see column 5, lines 17-34; Example 1 and Table 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine an optimum pre-defined base quantity of analyte that is bound to and removed by the AMZ as taught by Buck within the system of Brooks et al., wherein non-specific binding would be accounted for, in order to optimize the assay method and allow for the detection of an extended range of analyte concentration.

Finally, with respect to Applicant's final argument, Buck does in fact teach the test strip elements of a wicking (sampling) pad 14, a conjugate zone or pad 18, and a porous membrane 12, wherein the wicking pad defines the AMZ (scavenging zone), the conjugate pad contains indicator reagents (detection probes), and the porous membrane defines a test line 22 (detection zone) (see Figure 1; and column 3, lines 30-67; column 4, lines 1-50; and column 5, lines 17-30). Although, the Buck reference

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does fail to teach the inclusion of a "calibration zone," this element is taught by the primary reference of Brooks et al. and therefore, does not need to be taught by Buck as well given that the rejection over the claims is based on the combination of the two references. Applicant appears to be arguing against the references individually, and one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline DiRamio whose telephone number is 571-272-8785. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacqueline DiRamio/
Examiner, Art Unit 1641

/Long V Le/
Supervisory Patent Examiner, Art Unit 1641